Savannah River Remediation

We do the right thing.

H-Area Tank Farm Performance Assessment Overview

Presentation to the Savannah River Site Citizens Advisory Board Waste Management Committee

April 26, 2011

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Closure and Waste Disposal Authority

SRR-CWDA-2011-00064

Purpose

- H-Area Tank Farm Performance Assessment has been issued to South Carolina Department of Health and Environmental Control and Environmental Protection Agency for review
- Public notified via Environmental Bulletin Vol. 23 No. 11 and document available at http://sro.srs.gov/f_htankfarmsdocuments.htm

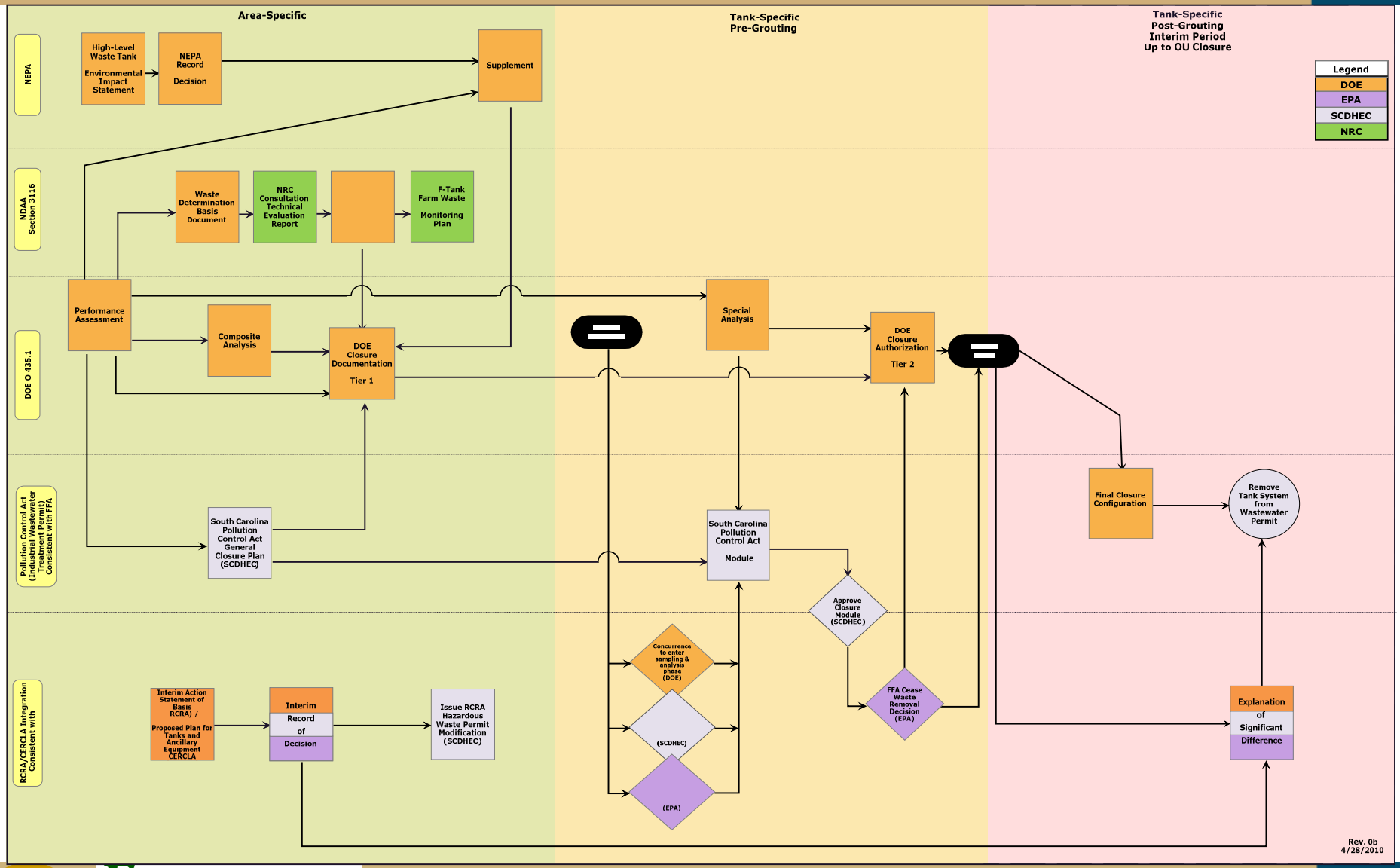
What is a PA?

- PA = Performance Assessment
- A Performance Assessment is a key risk assessment tool used to inform closure decisions
  - Models fate and transport of contaminants over long periods of time to determine potential consequences
  - Utilizes informed assumptions
  - Provides most likely consequences of planned actions

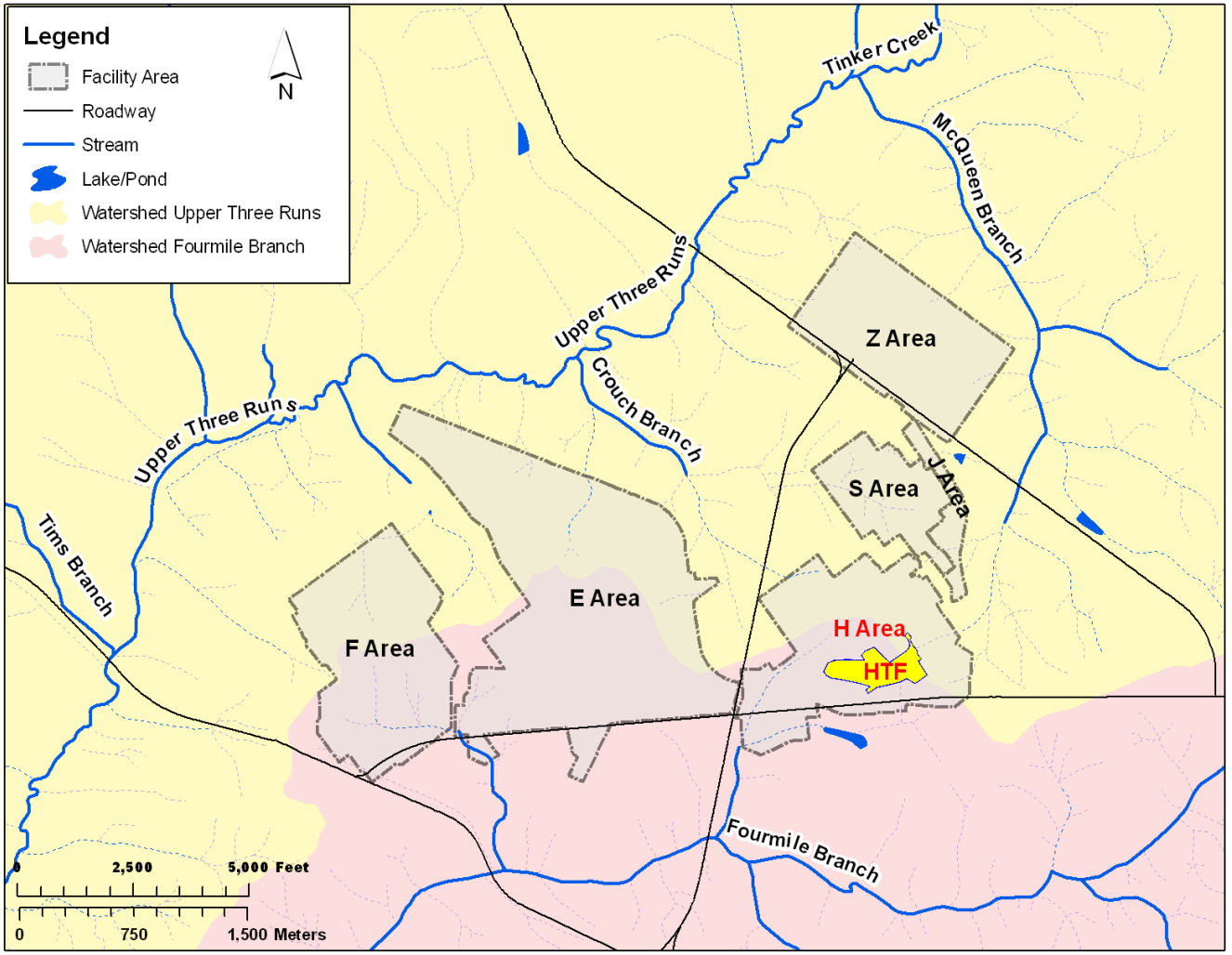
How does a PA inform?

- PA provides best estimation of what the dose consequences or chemical concentrations will be over time
  - Focused on determining peak dose or chemical concentration – worst one-year period
  - Reflects potential variation in parameters and identifies key parameters for which the model has the greatest sensitivity (importance)

Regulatory Document Path

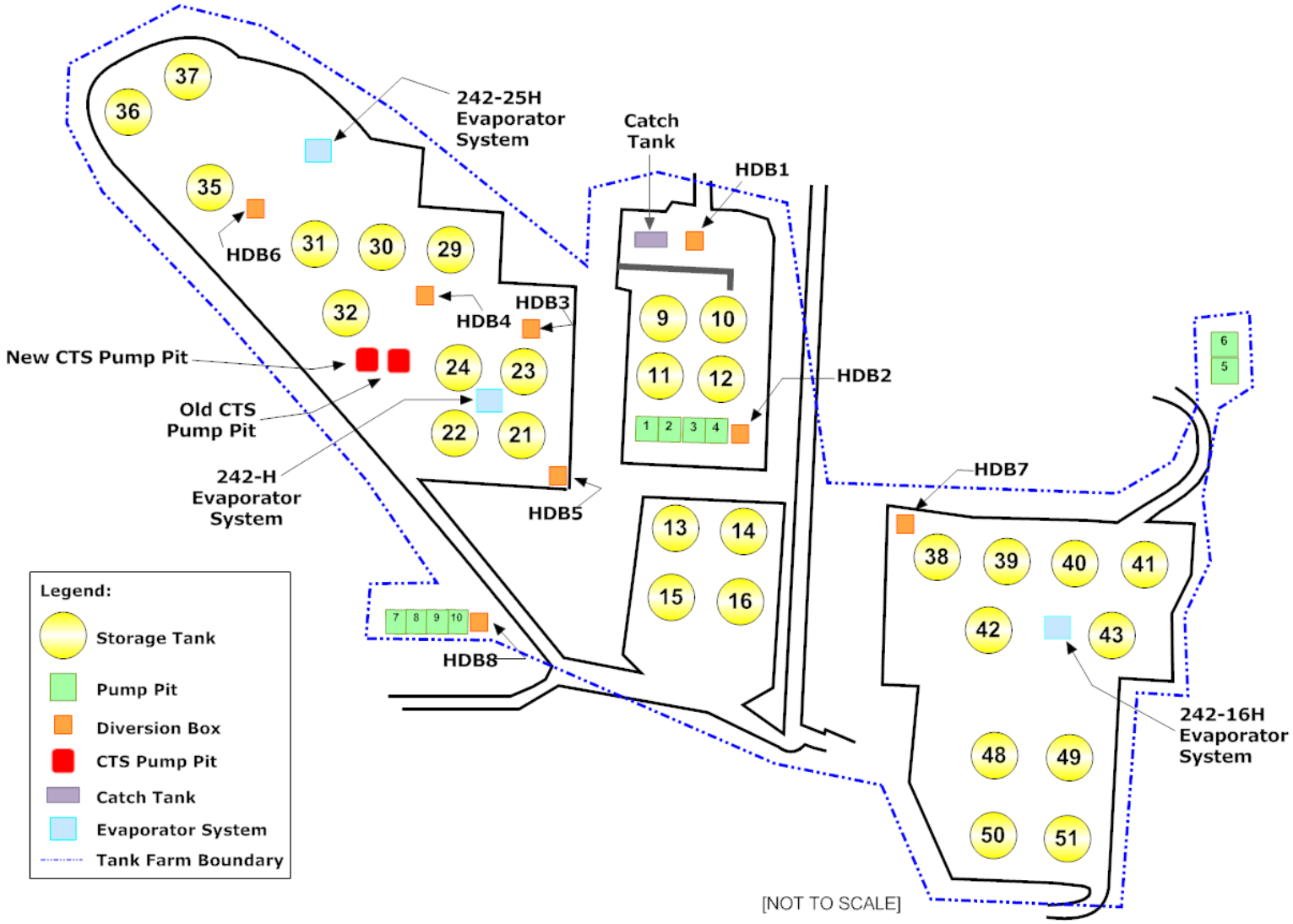


General Separations Area



General Separations Area

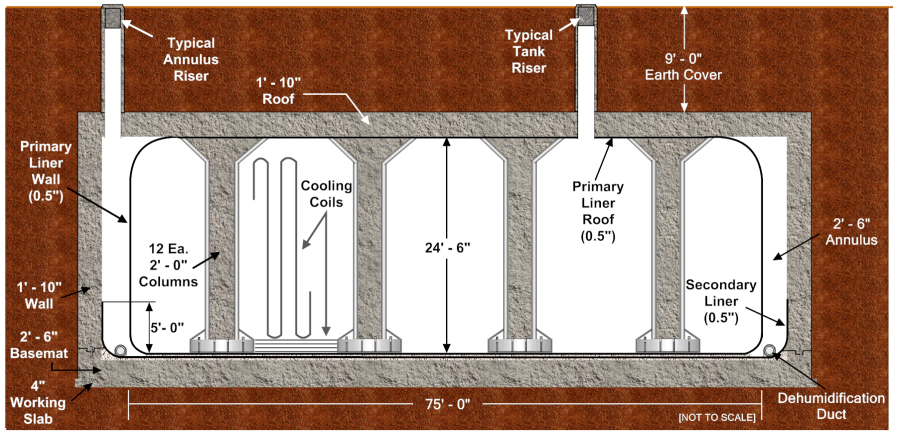
H-Area Tank Farm



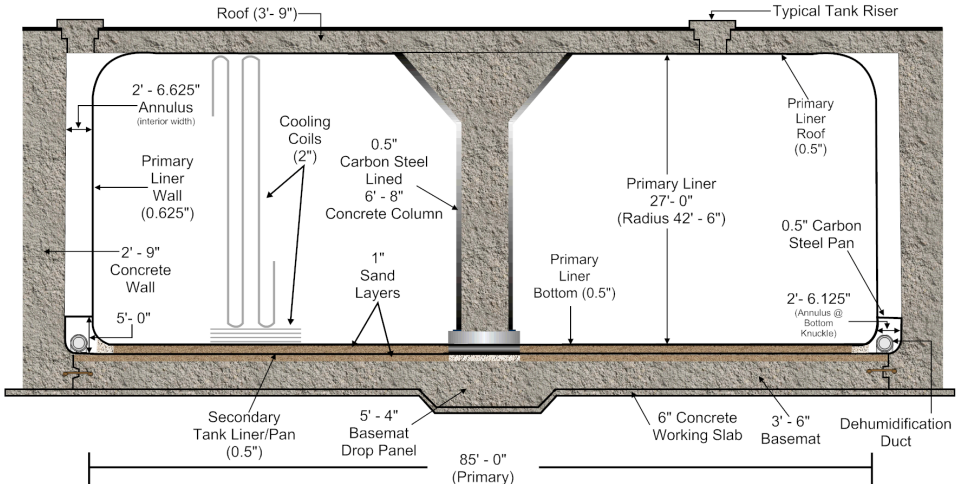
H-Area Tank Farm

Tank Designs

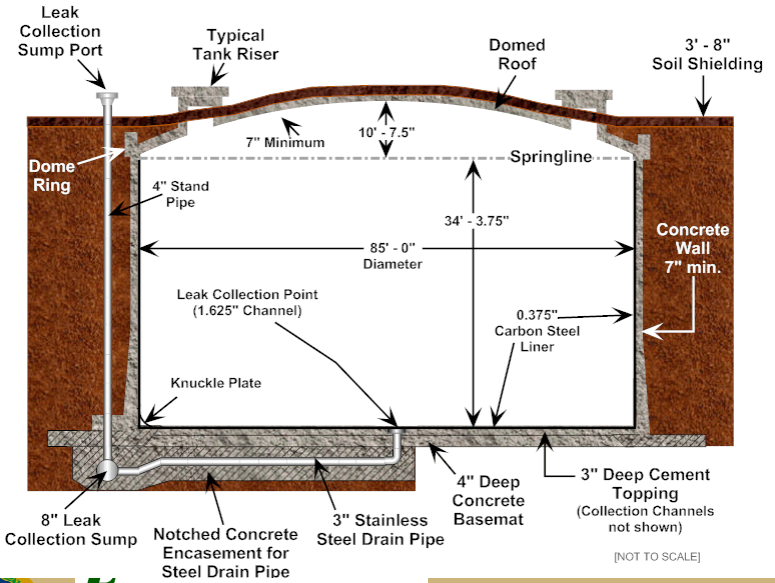
TYPICAL TYPE I WASTE TANK



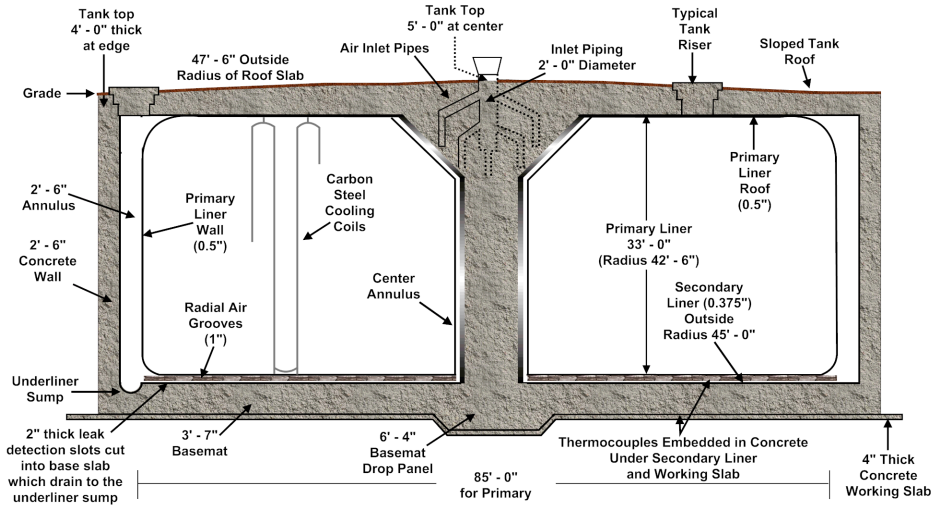
TYPICAL TYPE II WASTE TANK



TYPICAL TYPE IV WASTE TANK



TYPICAL TYPE IIIA WASTE TANK



H-Area Tank Farm Information

- 29 waste tanks
  - 4 Type I tanks
  - 4 Type II tanks
  - 4 Type IV tanks
  - 17 Type III/IIIA tanks
- 3 evaporators
- 11 pump tanks
- ~75,000 feet of transfer lines

HTF PA Development

- PA development began – October 2009
- Public scoping meetings were held April 2010 with NRC, SCDHEC and EPA to discuss primarily approaches and inputs that were different from the FTF PA
- Revision A of the PA submitted to DOE-SR for internal review September 2010
- Revision B submitted for DOE-HQ Low Level Waste Disposal Facility Federal Review Group review November 2010
- Issued Revision 0 to SCDHEC and EPA in March 2011

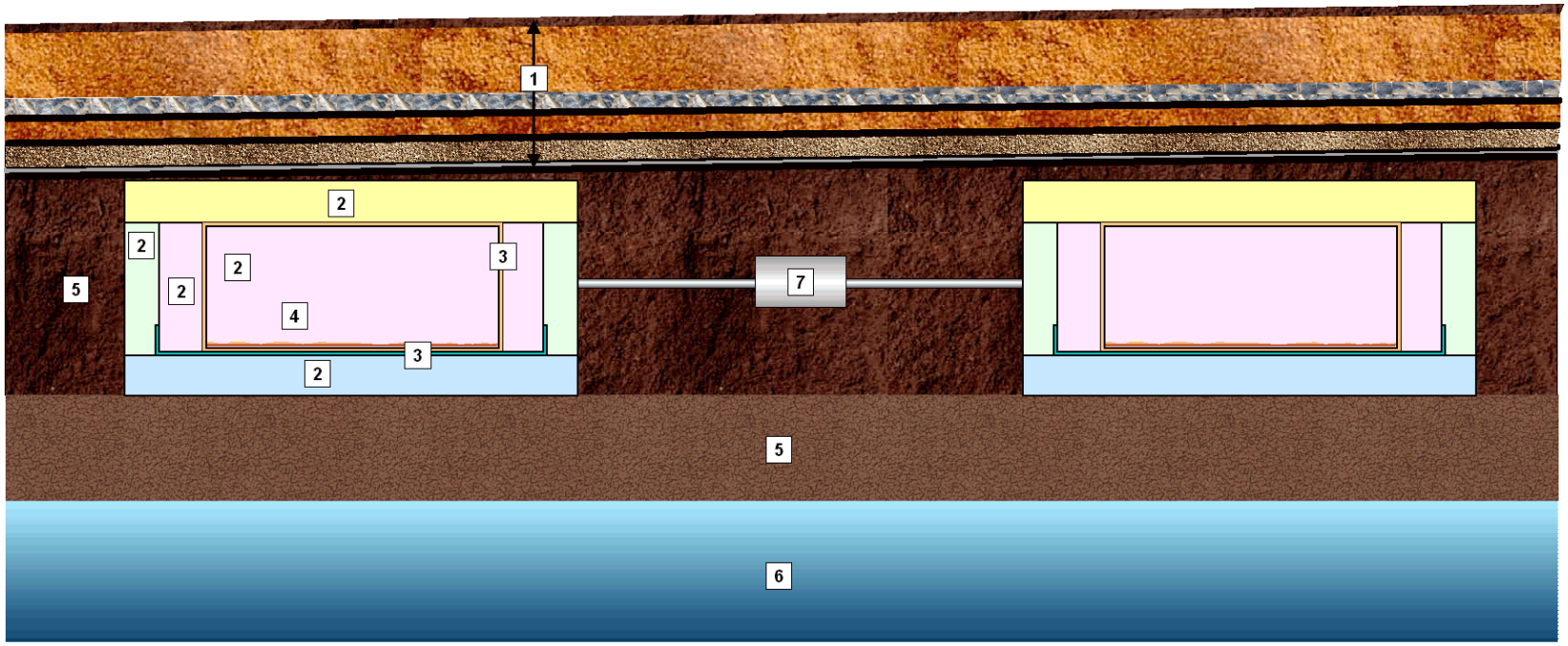
HTF PA Contents Overview

- Eleven Chapters
- Appendices A-O containing modeling outputs
- 391 figures and 198 tables of information in the body of the PA
- 3608 total pages between the PA body (864 pages) and appendices
- 336 references utilized in development of PA

Hybrid Modeling Approach

- Modeling is a hybrid approach with the deterministic results (single "best estimate" answer) as the baseline and the sensitivity/uncertainty analyses performed with a probabilistic code (range of results) to evaluate all parameters at once
- Probabilistic analyses will indicate the most sensitive parameters

Conceptual Model

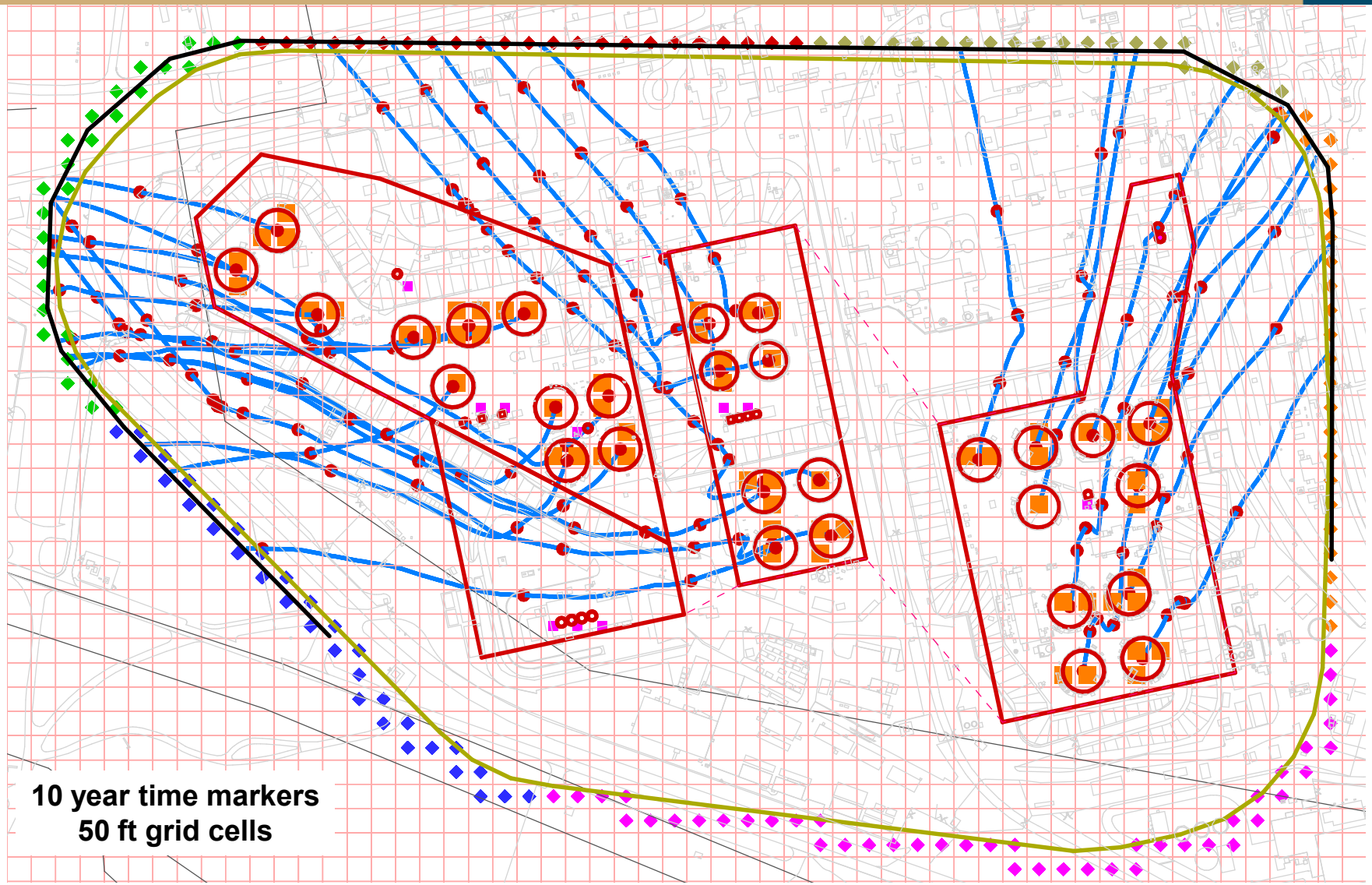


- Complex system is broken down to more simplistic modeling features which each can change/degrade over time

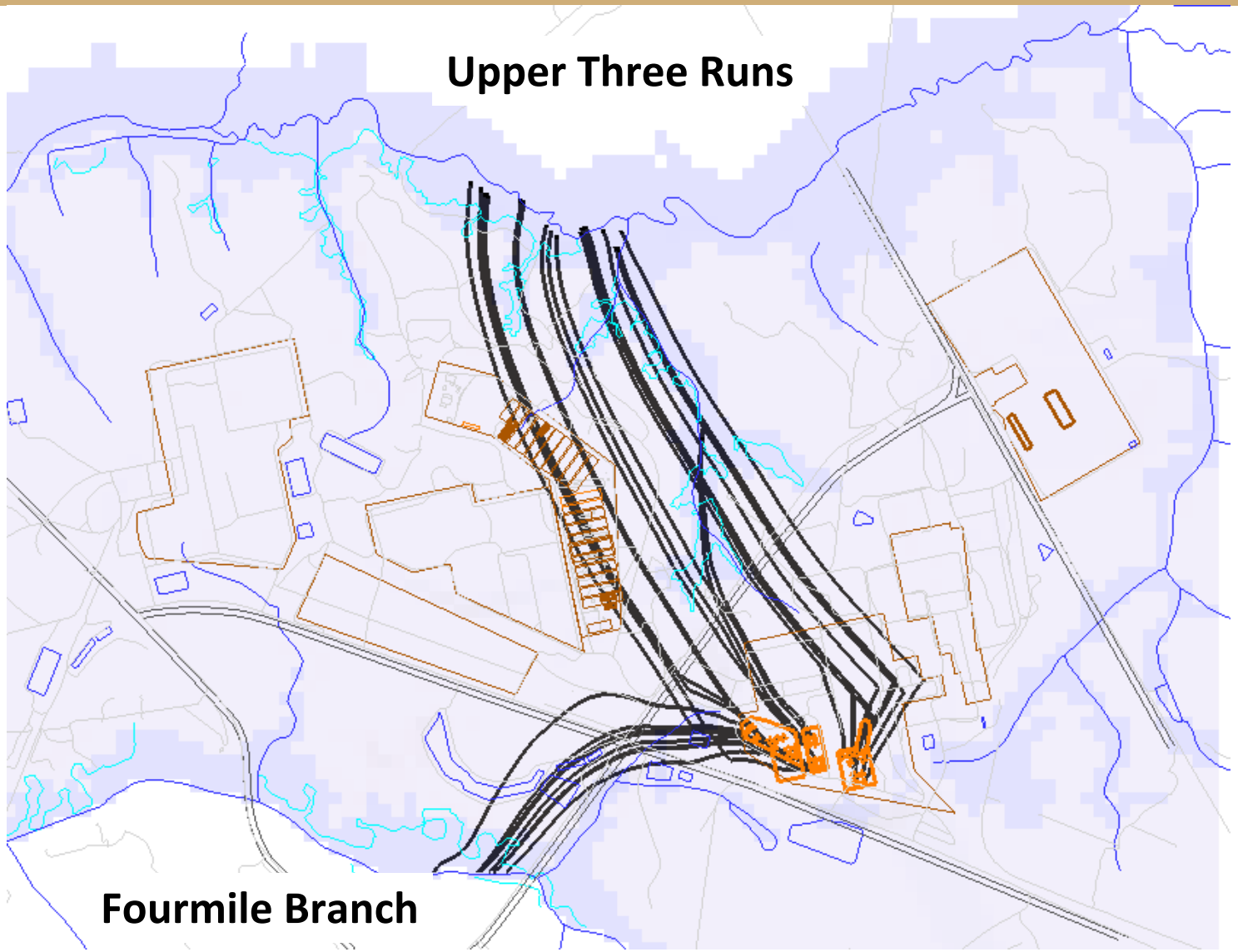
HTF Hydrogeology

- Four tanks assumed to be fully submerged in the water table and four tanks assumed to be partially submerged
- Flow in multiple directions and many influenced by a groundwater flow divide within HTF
- Significant plume spread due to flow divide

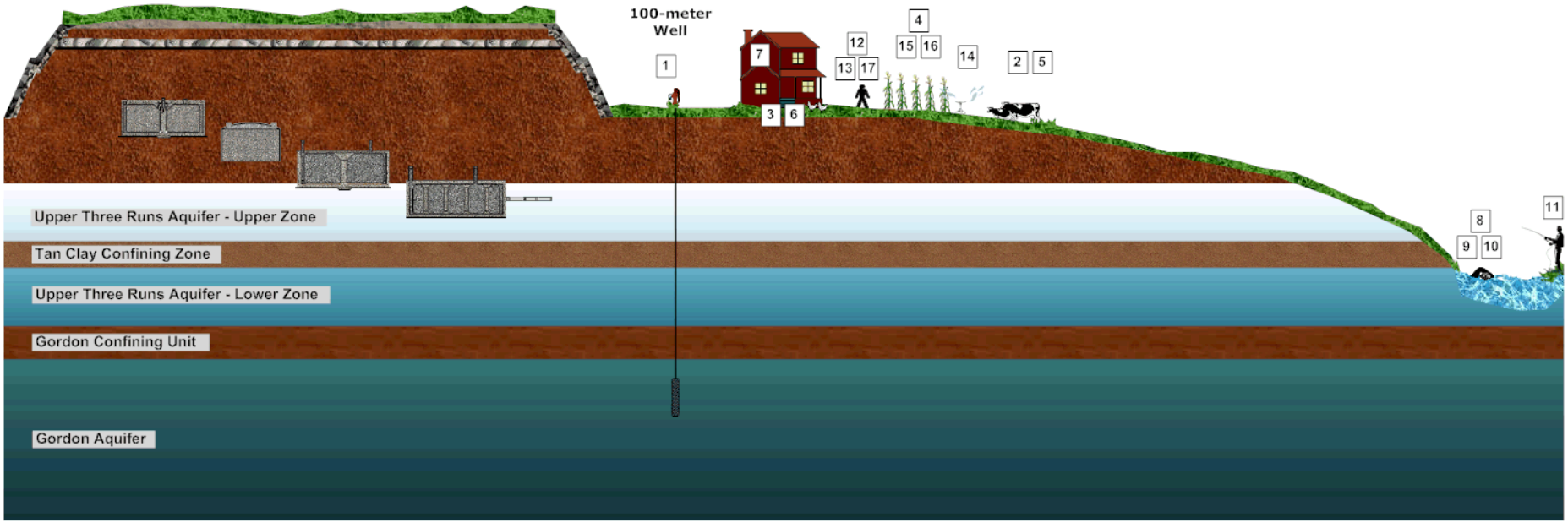
Near-Field Tank Aquifer Streamtraces



Far-Field Tank Aquifer Streamtraces



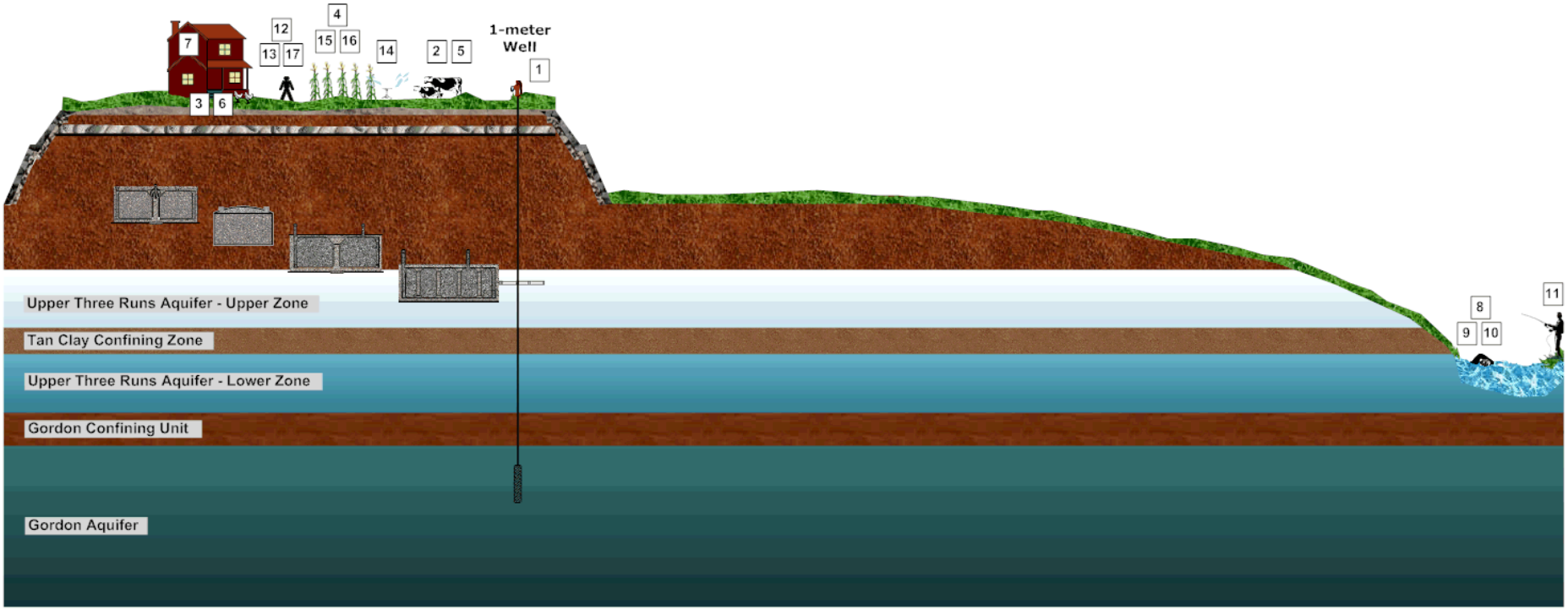
Member of the Public Pathways



SCENARIO WITH WELL WATER AS PRIMARY WATER SOURCE

1. Direct ingestion of well water
2. Ingestion of milk and meat from livestock (e.g., dairy and beef cattle) that drink well water
3. Ingestion of meat and eggs from poultry that drink well water
4. Ingestion of vegetables grown in garden soil irrigated with well water
5. Ingestion of milk and meat from livestock (e.g., dairy and beef cattle) that eat fodder from a pasture irrigated with well water
6. Ingestion of meat and eggs from poultry that eat fodder from a pasture irrigated with well water
7. Ingestion and inhalation of well water while showing
8. Direct irradiation during recreational activities (e.g., swimming, fishing, boating) from stream water
9. Dermal contact with stream water during recreational activities (e.g., swimming, fishing)
10. Incidental ingestion and inhalation of stream water during recreational activities
11. Ingestion of fish from the stream water
12. Direct plume shine
13. Inhalation
14. Inhalation of well water used for irrigation
15. Inhalation of dust from the soil that was irrigated with well water
16. Ingestion of or dermal contact with soil that was irrigated with well water
17. Direct radiation exposure from radionuclides deposited on the soil that was irrigated with well water

Chronic Intruder Pathways



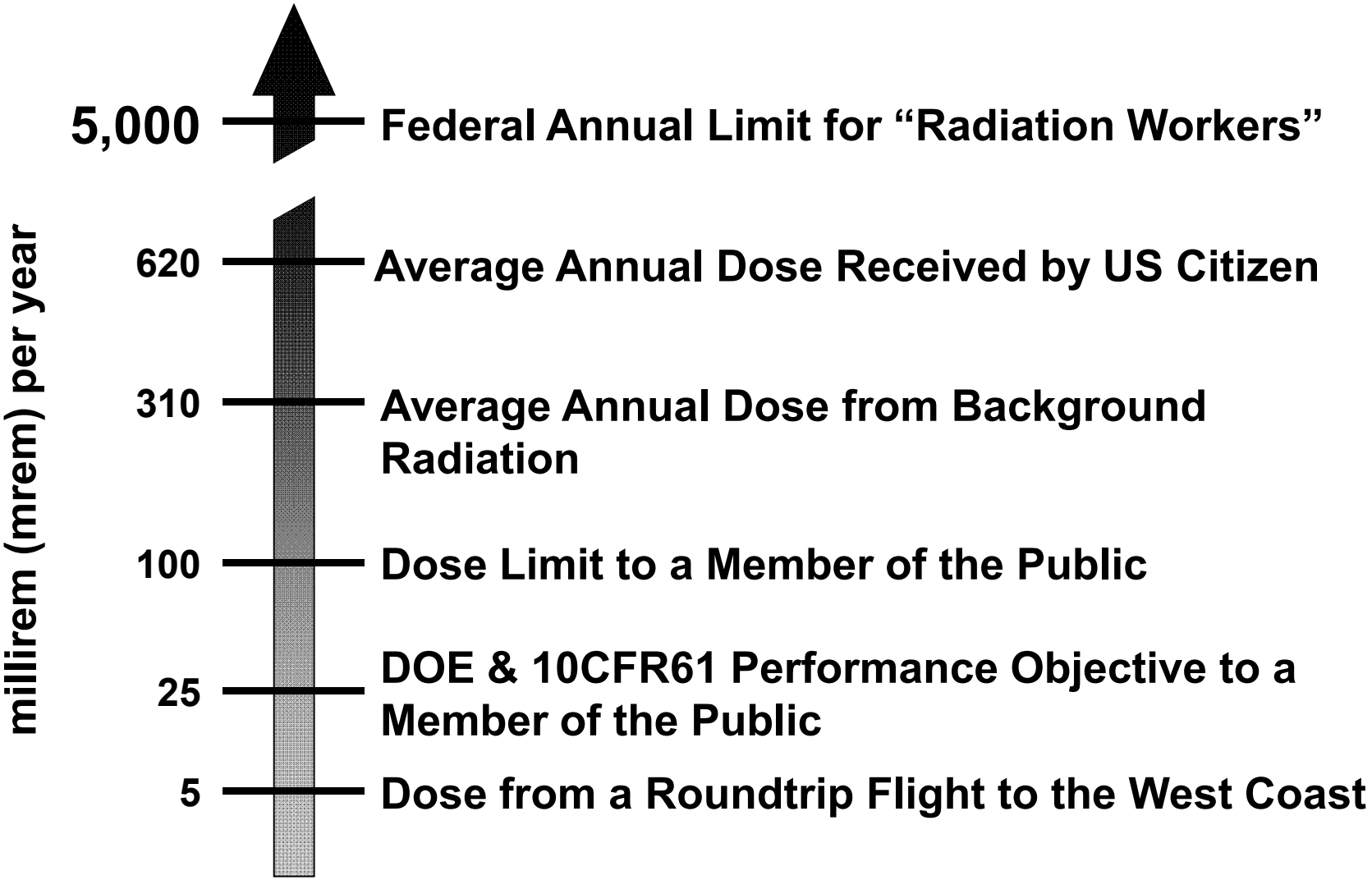
CHRONIC INTRUDER-AGRICULTURAL (POST-DRILLING) SCENARIO

1. Direct ingestion of well water
2. Ingestion of milk and meat from livestock (e.g., dairy and beef cattle) that drink well water
3. Ingestion of meat and eggs from poultry that drink well water
4. Ingestion of vegetables grown in garden soil irrigated with well water and containing contaminated drill cuttings
5. Ingestion of milk and meat from livestock (e.g., dairy and beef cattle) that eat fodder from a pasture irrigated with well water
6. Ingestion of meat and eggs from poultry that eat fodder from a pasture irrigated with well water
7. Ingestion and inhalation of well water while showing
8. Direct irradiation during recreation activities (e.g., swimming, fishing, boating) from stream water
9. Dermal contact with stream water during recreational activities (e.g., swimming, fishing)
10. Incidental ingestion and inhalation of stream water during recreational activities
11. Ingestion of fish from the stream water
12. Direct plume shine
13. Inhalation
14. Inhalation of well water used for irrigation
15. Inhalation of dust from the soil that was contaminated by drill cuttings and irrigated with well water
16. Ingestion of soil that was contaminated by drill cuttings and irrigated with well water
17. Direct radiation exposure from radionuclides on the soil that was contaminated by drill cuttings and irrigated with well water

Bases for Requirements

- PA development process is regulated by DOE Order 435.1
- Closure requirements are based on:
  - DOE Order 435.1
  - 10 CFR 61 Performance Objectives as dictated by Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005
  - SCDHEC “Standards for Wastewater Facility Construction” [SCDHEC R.61-67]

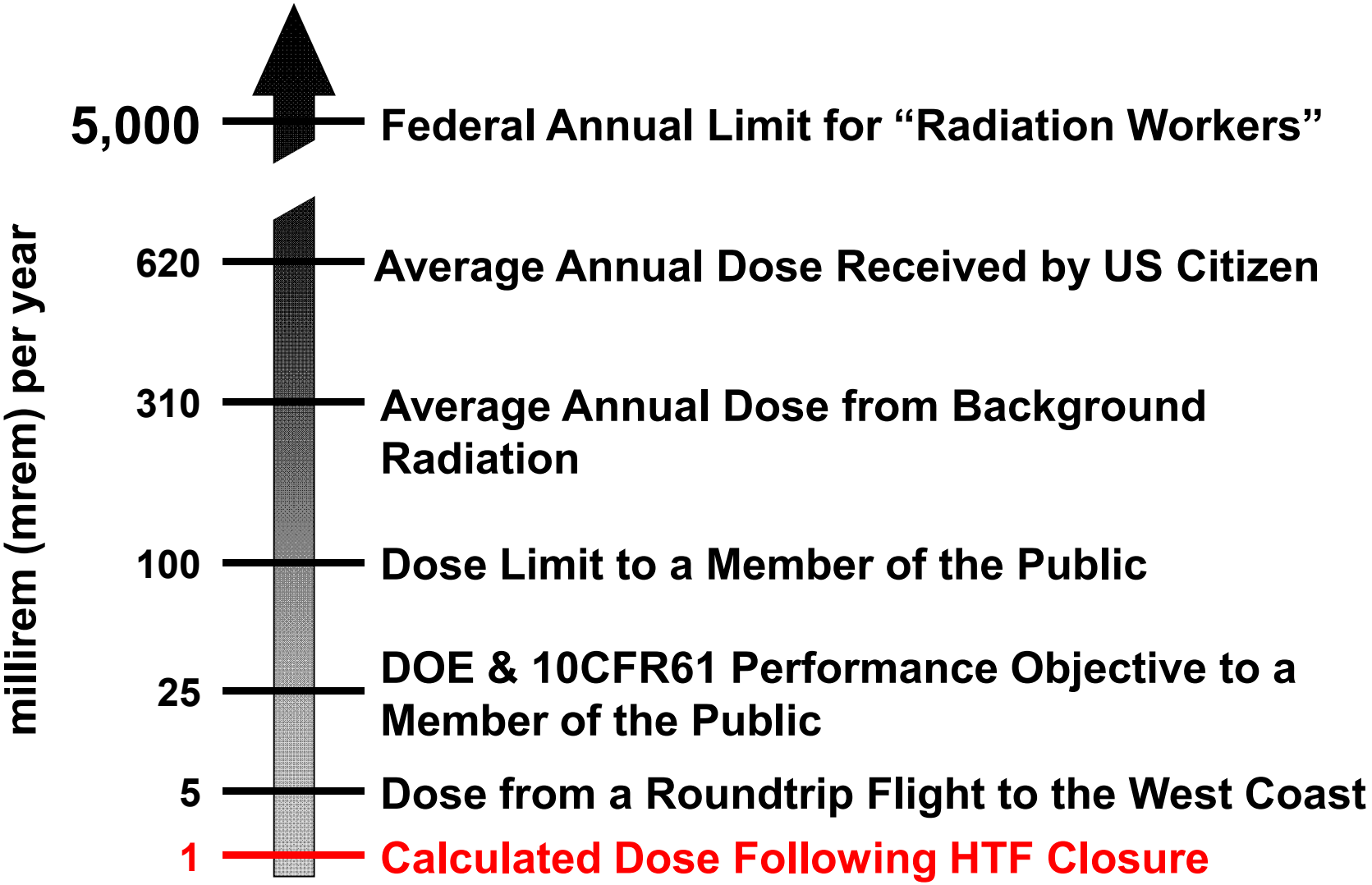
Perspective



Conclusions

Performance Measure			PA Result
DOE O 435.1	All-Pathways Dose	25 mrem/yr	1.0 mrem/yr @ 100m
DOE O 435.1	Intruder Dose	500 mrem acute 100 mrem/yr chronic	0.7 mrem acute 54 mrem/yr chronic
DOE O 435.1	Air Pathways Dose	10 mrem/yr	~4E-06 mrem/yr @ 100m
DOE O 435.1	Radon Flux	20 pCi/m^2/s At ground surface	1.8E-15 pCi/m^2/s
DOE O 435.1 And Safe Drinking Water Act	Groundwater Protection - Maximum Contaminant Levels	<MCLs	<MCLs
10 CFR 61.41	All-Pathways Dose	25 mrem/yr	1.0 mrem/yr @ 100m
10 CFR 61.42	Intruder Dose	500 mrem/yr	54 mrem/yr

Perspective



Summary

- HTF PA has been completed and is currently undergoing external review
- PA provides information to inform closure decisions
- Planned HTF closure activities result in peak doses/concentrations below regulatory requirements
- PA posted at: http://sro.srs.gov/f_htankfarmsdocuments.htm